# Field Guide to Small Animal Veterinary Rehabilitation

UNIVERSITY OF NORTH CAROLINA CHARLOTTE

FANGInstitute
Most Advanced Veterinary Education on Earth

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Charlotte, North Carolina

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**Key Terms:**

1. **Gout**: a form of arthritis with uric acid crystal deposits in joints
2. **Arthritis**: painful inflammation and stiffness of the joint that involves only soft tissue
3. **Osteoarthritis**: painful inflammation and stiffness of the joint that involves soft tissue and bone
4. **Rheumatoid Arthritis**: a form of arthritis caused by the immune system
5. **Inflammation**: response to injury or infection resulting in redness, swelling, hotness, and possibly pain

## 5 Cardinal Signs of Inflammation:

1. **Rubor**: Redness
2. **Calor**: Heat
3. **Tumor**: Swelling
4. **Dolor**: Pain
5. **Functio** Lasea: Loss of Function

## 6 Sensory Targets:

1. **Sight**
2. **Sound**
3. **Smell**
4. **Taste**
5. **Touch**
6. **Biochemical Signaling**

# Rehabilitation Appointment:

**But I'm just here for vaccines, why do I need rehab?:** It is our duty to share all medical problems and medical recommendations to the pet owners that may benefit the animals' health and overall well being. They cannot tell their owner their knee, neck, or back is in pain or that they are having trouble getting up and walking around. We must always observe and advocate for what is best for the animal no matter the financial cost. Rehabilitation is a core part of preventative veterinary medicine and belongs in every practice in the United States and beyond. Let us begin…

## Questions:

1. How long has the lameness been going on?
2. Has the lameness gotten better or worse?
3. Did the lameness start after some traumatic event?
4. Does the lameness get better or worse with walking?
5. Is it difficult for them to get up from laying down?
6. Do they have difficulty going up and down stairs?
7. Is there a history of other diseases (cancer, tick-borne, infections, autoimmune)?
8. Where is the source of the lameness and/or pain (neck, one or multiple legs, back)?
9. Are they acting right (neurologic)?
10. What are your goals for your animal (stairs, long walk, run, etc.)?

## Rehabilitation Appointment Outline:

Observe them from a distance walking, sitting, standing still, laying down. Watch for trembling, shifting their weight, and/or limping. Start with the not painful legs first and palpate and bend each joint starting from the toes and going up to the shoulder/hip. Keep an eye out for signs of pain and be careful as they may bite. Feel the muscles of the head, neck, back, and each leg for one or both sides showing weakness or atrophy. Check the incision site if there is one. Check the animal rear for poop and urine scald and clean area, then apply Desitin if the skin is irritated.

## Rehabilitation How Often?:

Always talk to owners about our plans and Pet Pick-Up because it saves them a lot of time and money as well as produces the best results for the animal.

Rehab Plans:

1. 1 session only (generally includes 2 modalities and lasts for about 30 minutes on average +/- 15 minutes)
2. 1x4 (1 session a week for 4 weeks)
3. 2x4 (2 sessions a week for 4 weeks)
4. 2x8 (2 sessions a week for 8 weeks)

Pet Pick-Up:

1. Pick-Up only
2. Drop-Off only
3. Pick-Up + Drop-Off

## Rehabilitation Flexibility Options?:

Always consider talking to owners about our ability to offer rehabilitation at our hospital, during boarding or hospitalization, peri-euthanasia, and in the near future for house-call and at any other veterinary or boarding facility.

# Objective Scoring Systems:

**Why do we need to score everything with a number?:** In science and medicine we must limit subjectivity as much as possible. No one can refute or confuse a widely accepted objective scoring system with defined numbers. Objective scoring systems are faster, more efficient, and lead to a better standard of care.

## Pain Scale (0-4)

0: No pain when palpating affect joint
1: Mild pain when palpating affected joint
2: Moderate pain when palpating affected joint
3: Severe pain when palpating affected joint
4: So painful the dog will not allow palpating affected joint

## Lameness Score (0-5)

0: Walks normal
1: Inconsistent slight lameness that comes and goes but still putting weight on the leg
2: Consistent lameness but still putting weight on the leg
3: Severe lameness but still putting weight on the leg
4: Inconsistent severe lameness with NOT putting weight on the leg
5: Consistent severe lameness with NOT putting weight on the leg

## Body Condition Score (1-9)

1: “One of the skinniest dog you’ve ever seen”
2: Ribs, spine, and pelvis seen sticking out from a distance
3: Ribs seen easily from a distance
4: IDEAL: ribs not seen easily but felt easily when palpating
5: IDEAL: ribs not seen easily but kind of felt when palpating
6: Ribs a little difficult to feel with abdominal tuck still visible
7: Ribs very difficult to feel with abdominal tuck barely visible and a little bit of fat at the base of the tail
8: Can’t feel ribs, a lot of fat at the base of the tail, maybe a large belly
9: “One of the fattest dogs you’ve ever seen”

## Muscle Condition Score (0-3)

0: Normal muscle mass
1: Mild muscle loss
2: Moderate muscle loss
3: Severe muscle loss

## Stress Score (0-5)

0: Extremely happy and attention seeking
1: Calm and relaxed not concerned but not very outgoing
2: Alert but calm and cooperative
3: Tense but cooperative and easily lead by leash
4: Very tense, anxious, shaking, whining, will not sit or lay down, difficult on leash and encouragement doesn't help
5: Extremely stressed, barking, trying to hide, refuses to walk on leash

Colorado State University

Date _____

Time _____

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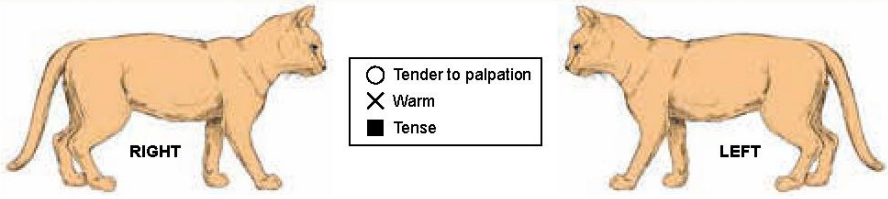
## Feline Acute Pain Scale

| | | | | |
|---|---|---|---|---|
| | Rescore when awake | ☐ **Animal is sleeping, but can be aroused - Not evaluated for pain**<br>☐ **Animal can't be aroused, check vital signs, assess therapy** | | |
| Pain Score | Example | Psychological & Behavioral | Response to Palpation | Body Tension |
| 0 | | ☐ **Content and quiet** when unattended<br>☐ **Comfortable** when resting<br>☐ Interested in or **curious** about surroundings | ☐ **Not bothered** by palpation of wound or surgery site, or to palpation elsewhere | Minimal |
| 1 | | ☐ **Signs are often subtle and not easily detected in the hospital setting**; more likely to be detected by the owner(s) at home<br>☐ Earliest signs at home may be **withdrawal from surroundings or change in normal routine**<br>☐ In the hospital, may be content or slightly unsettled<br>☐ **Less interested** in surroundings but will look around to see what is going on | ☐ May or may not react to palpation of wound or surgery site | Mild |
| 2 | | ☐ Decreased responsiveness, **seeks solitude**<br>☐ **Quiet**, loss of brightness in eyes<br>☐ **Lays curled up or sits tucked up** (all four feet under body, shoulders hunched, head held slightly lower than shoulders, tail curled tightly around body) with eyes partially or mostly closed<br>☐ **Hair coat appears rough** or fluffed up<br>☐ May intensively groom an area that is painful or irritating<br>☐ Decreased appetite, **not interested in food** | ☐ **Responds aggressively or tries to escape** if painful area is palpated or approached<br>☐ Tolerates attention, may even perk up when petted as long as painful area is avoided | Mild to Moderate<br>**Reassess analgesic plan** |
| 3 | | ☐ Constantly **yowling, growling, or hissing** when unattended<br>☐ May bite or chew at wound, but **unlikely to move** if left alone | ☐ **Growls or hisses at non-painful palpation** (may be experiencing allodynia, wind-up, or fearful that pain could be made worse)<br>☐ **Reacts aggressively** to palpation, **adamantly pulls away** to avoid any contact | Moderate<br>**Reassess analgesic plan** |
| 4 | | ☐ Prostrate<br>☐ Potentially **unresponsive** to or unaware of surroundings, difficult to distract from pain<br>☐ Receptive to care (even mean or wild cats will be more tolerant of contact) | ☐ **May not respond** to palpation<br>☐ **May be rigid to avoid painful movement** | Moderate to Severe<br>**May be rigid to avoid painful movement**<br>**Reassess analgesic plan** |




Comments _____

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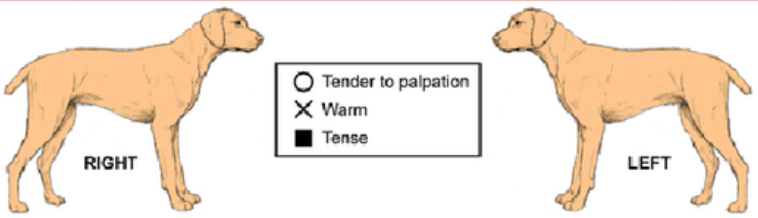
**Canine Acute Pain Scale**

Rescore when awake
- ☐ **Animal is sleeping, but can be aroused - Not evaluated for pain**
- ☐ **Animal can't be aroused, check vital signs, assess therapy**

| Pain Score | Example | Psychological & Behavioral | Response to Palpation | Body Tension |
|---|---|---|---|---|
| 0 | | ☐ **Comfortable** when resting<br>☐ **Happy, content**<br>☐ Not bothering wound or surgery site<br>☐ Interested in or curious about surroundings | ☐ **Nontender** to palpation of wound or surgery site, or to palpation elsewhere | Minimal |
| 1 | | ☐ **Content to slightly unsettled** or restless<br>☐ **Distracted easily** by surroundings | ☐ **Reacts to palpation** of wound, surgery site, or other body part by **looking around, flinching,** or **whimpering** | Mild |
| 2 | | ☐ Looks **uncomfortable** when resting<br>☐ May **whimper** or cry and may **lick or rub wound** or surgery site when unattended<br>☐ Droopy ears, **worried facial expression** (arched eye brows, darting eyes)<br>☐ **Reluctant to respond** when beckoned<br>☐ **Not eager to interact** with people or surroundings but will look around to see what is going on | ☐ Flinches, whimpers cries, or guards/pulls away | Mild to Moderate<br>**Reassess analgesic plan** |
| 3 | | ☐ **Unsettled, crying, groaning, biting or chewing** wound when unattended<br>☐ **Guards or protects** wound or surgery site by altering weight distribution (i.e., limping, shifting body position)<br>☐ **May be unwilling to move** all or part of body | ☐ May be **subtle** (shifting eyes or increased respiratory rate) if dog is too painful to move or is stoic<br>☐ May be **dramatic**, such as a sharp cry, growl, bite or bite threat, and/or pulling away | Moderate<br>**Reassess analgesic plan** |
| 4 | | ☐ **Constantly groaning or screaming** when unattended<br>☐ May bite or chew at wound, but unlikely to move<br>☐ **Potentially unresponsive** to surroundings<br>☐ **Difficult to distract** from pain | ☐ **Cries at non-painful palpation** (may be experiencing allodynia, wind-up, or fearful that pain could be made worse)<br>☐ May react aggressively to palpation | Moderate to Severe<br>**May be rigid to avoid painful movement**<br>**Reassess analgesic plan** |




**Comments** _____

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Supported by an Unrestricted Educational Grant from Pfizer Animal Health

| LAMENESS SCALE (1 – 5 Scale) | |
|---|---|
| Grade 1: | Difficult to observe; not consistently apparent regardless of circumstance (i.e. circling, inclines, hard surfaces) |
| Grade 2: | Difficult to observe at a walk or trot in a straight line; consistently apparent under certain circumstances (i.e. Circling, inclines, hard surfaces) |
| Grade 3: | Consistently observable under all circumstances |
| Grade 4: | Obvious lameness; marked head bob, hitching, or shortened stride |
| Grade 5: | Minimal weight bearing in motion and/or at rest; inability to move limb |

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# Body Condition System

**TOO THIN**

**1** Ribs, lumbar vertebrae, pelvic bones and all bony prominences evident from a distance. No discernible body fat. Obvious loss of muscle mass.

**2** Ribs, lumbar vertebrae and pelvic bones easily visible. No palpable fat. Some evidence of other bony prominence. Minimal loss of muscle mass.

**3** Ribs easily palpated and may be visible with no palpable fat. Tops of lumbar vertebrae visible. Pelvic bones becoming prominent. Obvious waist and abdominal tuck.

**IDEAL**

**4** **Ribs easily palpable, with minimal fat covering. Waist easily noted, viewed from above. Abdominal tuck evident.**

**5** **Ribs palpable without excess fat covering. Waist observed behind ribs when viewed from above. Abdomen tucked up when viewed from side.**

**TOO HEAVY**

**6** Ribs palpable with slight excess fat covering. Waist is discernible viewed from above but is not prominent. Abdominal tuck apparent.

**7** Ribs palpable with difficulty; heavy fat cover. Noticeable fat deposits over lumbar area and base of tail. Waist absent or barely visible. Abdominal tuck may be present.

**8** Ribs not palpable under very heavy fat cover, or palpable only with significant pressure. Heavy fat deposits over lumbar area and base of tail. Waist absent. No abdominal tuck. Obvious abdominal distention may be present.

**9** Massive fat deposits over thorax, spine and base of tail. Waist and abdominal tuck absent. Fat deposits on neck and limbs. Obvious abdominal distention.

The **BODY CONDITION SYSTEM** was developed at the Nestlé Purina Pet Care Center and has been validated as documented in the following publications:


Mawby D, Bartges JW, Moyers T, et. al. ***Comparison of body fat estimates by dual-energy x-ray absorptiometry and deuterium oxide dilution in client owned dogs.*** *Compendium 2001; 23 (9A): 70*

Laflamme DP. ***Development and Validation of a Body Condition Score System for Dogs.*** *Canine Practice July/August 1997; 22:10-15*

Kealy, et. al. ***Effects of Diet Restriction on Life Span and Age-Related Changes in Dogs.*** *JAVMA 2002; 220:1315-1320*


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# Body Condition System

**TOO THIN**

**1** Ribs visible on shorthaired cats; no palpable fat; severe abdominal tuck; lumbar vertebrae and wings of ilia easily palpated.

**2** Ribs easily visible on shorthaired cats; lumbar vertebrae obvious with minimal muscle mass; pronounced abdominal tuck; no palpable fat.

**3** Ribs easily palpable with minimal fat covering; lumbar vertebrae obvious; obvious waist behind ribs; minimal abdominal fat.

**4** Ribs palpable with minimal fat covering; noticeable waist behind ribs; slight abdominal tuck; abdominal fat pad absent.

**IDEAL**

**5** **Well-proportioned; observe waist behind ribs; ribs palpable with slight fat covering; abdominal fat pad minimal.**

**TOO HEAVY**

**6** Ribs palpable with slight excess fat covering; waist and abdominal fat pad distinguishable but not obvious; abdominal tuck absent.

**7** Ribs not easily palpated with moderate fat covering; waist poorly discernible; obvious rounding of abdomen; moderate abdominal fat pad.

**8** Ribs not palpable with excess fat covering; waist absent; obvious rounding of abdomen with prominent abdominal fat pad; fat deposits present over lumbar area.

**9** Ribs not palpable under heavy fat cover; heavy fat deposits over lumbar area, face and limbs; distention of abdomen with no waist; extensive abdominal fat deposits.

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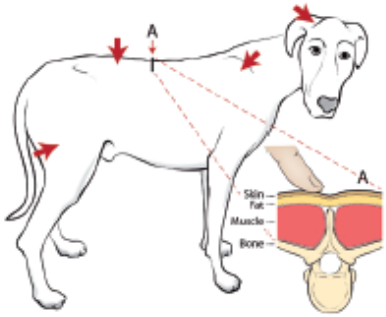
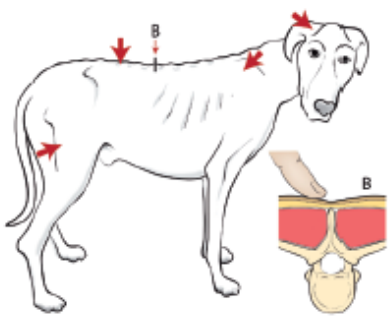
# Muscle Condition Score

Muscle condition score is assessed by visualization and palpation of the spine, scapulae, skull, and wings of the ilia. Muscle loss is typically first noted in the epaxial muscles on each side of the spine; muscle loss at other sites can be more variable. Muscle condition score is graded as normal, mild loss, moderate loss, or severe loss. Note that animals can have significant muscle loss if they are overweight (body condition score > 6). Conversely, animals can have a low body condition score (< 4) but have minimal muscle loss. Therefore, assessing both body condition score and muscle condition score on every animal at every visit is important. Palpation is especially important when muscle loss is mild and in animals that are overweight. An example of each score is shown below.

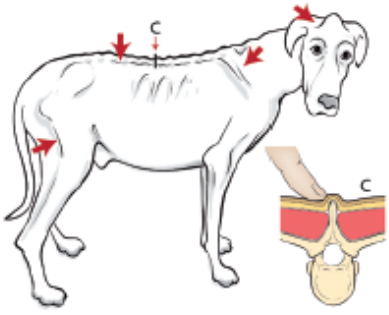
## Normal muscle mass



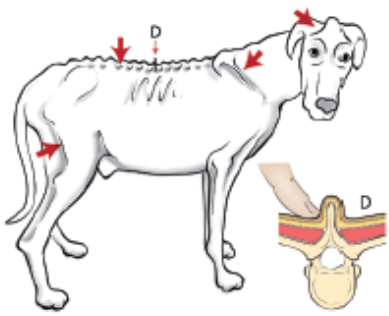

## Mild muscle loss




## Moderate muscle loss




## Severe muscle loss

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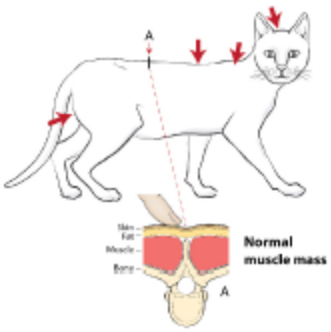
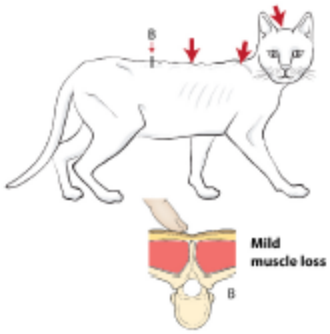
# Muscle Condition Score

Muscle condition score is assessed by visualization and palpation of the spine, scapulae, skull, and wings of the ilia. Muscle loss is typically first noted in the epaxial muscles on each side of the spine; muscle loss at other sites can be more variable. Muscle condition score is graded as normal, mild loss, moderate loss, or severe loss. Note that animals can have significant muscle loss even if they are overweight (body condition score > 5/9). Conversely, animals can have a low body condition score (< 4/9) but have minimal muscle loss. Therefore, assessing both body condition score and muscle condition score on every animal at every visit is important. Palpation is especially important with mild muscle loss and in animals that are overweight. An example of each score is shown below.

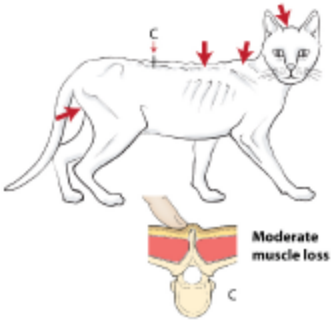
## Normal muscle mass



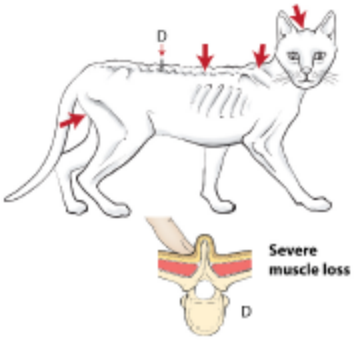

## Mild muscle loss




## Moderate muscle loss




## Severe muscle loss

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# Assigning a 'stress value' to dogs

Use this scale to rate pets' stress levels during each of the exam steps listed below. Any staff member can be trained to complete this task, which should be done at each visit.

| STRESS VALUE | DOG'S BEHAVIOR AND APPEARANCE |
|---|---|
| 0 | Extremely friendly, outgoing, solicitous of attention |
| 1 | Calm, relaxed, seemingly unmoved |
| 2 | Alert but calm and cooperative |
| 3 | Tensed but cooperative, panting slowly, not very relaxed, still easily led on lead but may need encouragement |
| 4 | Obviously very tensed, anxious, shaking, whining, will not sit/lie down, panting intensely, difficult to maneuver on lead and encouragement doesn't help |
| 5 | Extremely stressed, barking/howling, tries to hide, needs to be lifted up or brutally forced (please do not do this) when pulled by lead |

**CLINIC ENTRY:** Assess the dog's behavior upon entering the veterinary practice and in the waiting room.

0 1 2 3 4 5

**WEIGH-IN:** Assess the dog's behavior upon being weighed.

0 1 2 3 4 5

**ENTERING EXAM ROOM:** Assess the dog's behavior upon being brought into the exam room.

0 1 2 3 4 5

# Rehabilitation Diagnostics:

**Why do we need rehab diagnostics?:** Medicine means to treat AND track the health of the animal to know what we are doing is indeed helping or if we need to do more. Clients, technicians, and veterinarians will question the efficacy of rehabilitation and we must be able to not just tell them the benefits but show them as well.

## Lameness Analysis:

**What is it?:** We are looking for where the pain/limping is and if it's gotten better or worse.

**Indication:** May potentially help determine which legs and joints are painful, inflamed, weak, or lame.

**Example Protocol:** In any order, record the joint range of motion of all four legs at the 3 different joints on each leg. Also, make sure to measure the lame leg/joint or suspected lame leg/joint last! If you do it first, the dog will be very painful and might not give accurate measurements for the other normal legs/joints.

**Rehab Tips:** Make sure to record all the numbers! Also make sure to hit start and stop recording on the camera!

1. **Joint Range of Motion:**

Make sure to start from the foot and work your way up and on the normal joints/legs first, then the painful joints/legs last. Then, record using the goniometer the flexion and extension degrees for each joint. Make note of any pain or any popping, clicking, or cracking sound/feeling (Crepitus).

Front Legs
- Carpus (wrist)
- Elbow
- Shoulder

Back Legs
- Tarsus (ankle)
- Stifle (knee)
- Hip

2. **Angular Velocity:**

Set up the horizontal and vertical line boards behind an area you would like to capture the horizontal/vertical velocity or max jump height of the dog. Make sure to note if the dog is going over specific obstacles while the measurement is taken. Record the animal using a portable camera and record the exercise as well as the frame rate (frames/second) of the video recording. Now, see what the distance traveled is using the number of lines in one frame (distance traveled in one second) and you will have the velocity of the dog.

3. **Stance Analysis:**

This will require two people most likely. Have the animal stand still on all four legs without leaning against anything or moving. Place each scale under each foot with the foot in the center of the scales. Record the weight of each scale once all scales have been placed. All scales combined should equal the dogs total weight and reveal the percent distribution of weight per leg. The legs that have more weight on them should be compensating for the weak or lame leg which has the least weight.

## Holographic Imaging (3D Video or Surface Scan):

**What is it?:** We are recording a 3D video to help see where the pain/limping is or if it's gotten better or worse.

**Indication:** May potentially help locate and describe pain, inflammation, lameness, surgeries, procedures, injuries, and disease processes in the animal.

**Example Protocol:** Can be used to capture lameness, therapeutic procedure, surgical procedure, euthanasia, anything.

**Rehab Tips:** Make sure to hit start and stop recording! Also, make sure things that you want to be seen are in the capture bubble and things you don't want to be seen are not in the capture bubble! The capture bubble can be adjusted on the computer. I have set the cameras not to record audio.

## Thermal Imaging:

**What is it?:** We are taking pictures that help show us exactly where the pain/inflammation is or if it's gotten better or worse.

**Indication:** May potentially help locate and describe pain, inflammation, therapeutic procedure, surgical procedure, injuries, and disease processes in the animal.

**Example Protocol:** Make sure to capture multiple images or video of the normal and abnormal tissue on opposite sides of the body.

**Rehab Tips:** I have set the cameras not to record audio. The small trigger focuses the image automatically and the large trigger takes an image. The camera takes about 8 images and averages them so hold it still when taking images. Images are about 10 times more accurate than the video. Turn the camera off and replace the lens cover after use.

## Musculoskeletal Ultrasound:

**What is it?:** We are looking at the muscles, ligaments, and joints for where the pain/limping is or if it's gotten better or worse.

**Indication:** May potentially help locate and describe pain, inflammation, injuries, and disease processes in the animal.

**Example Protocol:** Make sure to capture multiple images of the normal and abnormal tissue on opposite sides of the body.

**Rehab Tips:** REMOVE THE BATTERY AND CHARGE IT AFTER USE! Even when the ultrasound is off, it drains the battery.

## Nutrition and Nutraceutical Analysis:

**What is it?:** We are measuring exactly how many calories, protein, and supplements your pet needs.

**Indication:** May potentially help dogs that are obese, obese prone, have joint pain, or are predisposed to developing joint pain

**Example Protocol:** It is critical to have the kcal/kg of the food being fed (kcal/cup is fine but not as accurate). We should have the kcal/kg of Purina Pro Plan overweight management if they'd like to switch diets. Ask what food and supplements the animal gets fed.

**Rehab Tips:** Make sure to ask what food the animal is fed each day and if any treats, supplements, or table scraps are given as well. Find the dog food nutrition label and record the calorie content or metabolizable energy in kcal/kg. Fiber sources such as pumpkin or weight control diets can help make animals feel more full without eating as many calories. Taking weight off the dog can potentially help joint pain and mobility problems. Free feeding (leaving the food bowl full all day instead of meals) promotes obesity. The RER calculation does not include treats or table scraps which should be minimized and should not exceed 10% of their total RER calories per day. Don't forget to divide by 2 if the total daily calories are being fed at 2 meals per day!

Dogs trying to lose weight should be fed their calculated daily RER or Daily Resting Energy Requirement (kcal/day) = 30x(Body Weight in kg) + 70
To promote muscle gain, increase dietary protein by 5-15% for dogs with exercise. Protein should be 25% of the total diet. If the animal has dental disease, it cannot eat, no matter how good the food or supplement is. The same is true for palatability.

Good Supplement & Food Products:

1. Purina Pro Plan Overweight Management (cat/dog, wet/dry)
2. Nordic Naturals Fish Oil
3. Dasuquin MSM Joint Chews
4. Myos Collagen Joint Chews
5. Vetriscience Amilextin Joint Chews
6. Myos Muscle Powder
7. BullyMax Muscle Chews

Definitions:

1. “By-Product” = Cheaper foods may source protein from animals unfit for human consumption with systemic disease, drug residues, cancer or tumors, infectious diseases, dead on arrival to slaughterhouses, roadkill, horse, dead zoo animals, euthanized animals from shelters, and spoiled. By-Products include materials less desirable such as feet, spine, liver, lung, head, neck, brain, spleen, stomach, kidney, intestine, underdeveloped egg, diseased animals, and poop.
2. “Beef” = >70% beef material and 95% non water material
3. “Beef Dinner/Entree/Platter” = >10% beef material and >25% non water material
4. “With Beef” = >3% beef material and unknown non-water material
5. “Beef Flavor” = ~1% beef material, detectable by animal
6. “Beef Nuggets” = ~25% beef material
7. “Beef Formula” = ~25% beef material
8. “Beef Meal” = ~65% beef material and ~10% water
9. “Beef Dog Food” = ~95% beef material
10. “Poultry” = >70% poultry material and 95% non water material
11. “Poultry Dinner/Entree/Platter” = >10% poultry material and >25% non-water material
12. “With Poultry” = >3% poultry material and unknown non-water material
13. “Poultry Flavor” = ~1% poultry material, detectable by animal
14. “Poultry Nuggets” = ~25% poultry material
15. “Poultry Formula” = ~25% poultry material
16. “Poultry Meal” = ~65% poultry material and ~10% water
17. “Poultry Dog Food” = ~95% poultry material
18. “Meat Meal” = ~65% various animal protein and ~10% water
19. “Chicken By-Product Meal” = ~65% poultry animal protein material and ~10% water
20. “Pork Digest” = >1% pork (only a trace detectable amount needed)
21. “Meat and Bone Meal” = ~50% various animal protein material and ~5% water
22. Majority Animal Protein Source: at least 80% of protein source
23. “Treat” = no more than 10% of daily calorie intake
24. “High Protein” = at least 30% protein
25. “High Fat” = at least 20% fat
26. “High kcal/kg or kcal/cup” = at least 3900 kcal/kg or 525 kcal/cup
27. “Pre-Exercise Preparatory Supplement” = Given at least 45 min before exercise (no more than 4 hours prior to exercise)
28. “Peri-Exercise Rehydration & Electrolyte Supplement” = easily available at least 45 min before, during, or within 45 min after exercise
29. “Post-Exercise Recovery Supplement” = Given within 45 min after exercise
30. 0.5-1% body weight loss per week is ideal, however, muscle loss will occur exceeding 2% body weight loss per week which is not ideal (1lb. = 3500 cal)

Gastric Emptying & Food Absorption Rate in Dogs:

1. Gastric emptying & absorption rates in dogs is related to body weight and material type ingested. Dogs that weigh more, on average take a longer amount of time to reach peak concentration. When nutrients are in a liquid form, they take a shorter amount of time to reach peak concentration.
2. Fastest Peak Dry Dog Food Absorption After Eating = ~45 min
3. Average Peak Dry Dog Food Absorption After Eating = 91 min +/- 9 min
4. Average 25% of Animals at Peak Dry Dog Food Absorption After Eating = 85 min +/- 4 min
5. Average 50% of Animals at Peak Dry Dog Food Absorption After Eating = 154 min +/- 5 min
6. Average 75% of Animals at Peak Dry Dog Food Absorption After Eating = 240 min +/- 6 min

Common Nutraceuticals that may potentially help with arthritis:

1. SAMe (S-Adenosylmethionine)
2. Avocado/Soybean Unsaponifiables (ASU)
3. Copper
4. Zinc
5. Blueberry (Vaccinium cyanococcus)
6. Frankincense (Boswellia serrata)
7. Glucosamine Hydrochloride
8. Chondroitin Sulfate
9. Grape Seed Extract (Vitis vinifera)
10. Bromelain
11. Alpha Lipoic Acid (ALA)
12. Eicosapentaenoic Acid (EPA)
13. Docosahexaenoic Acid (DHA)
14. Eicosatetraenoic Acid (ETA)
15. Egg Shell Membrane
16. L-Glutathione
17. Green Lipped Mussel (Perna canaliculus)
18. Fish Oil (Omega 3 Fatty Acids)
19. Turmeric (Curcuma domestica)
20. Barberry (Berberis crataegina)
21. Cat's Claw (Unicaria guyanensis)
22. Astaxanthin
23. N, N-Dimethylglycine (DMG)
24. Manganese
25. Hyaluronic Acid (Sodium Hyaluronate)
26. Selenium
27. Coenzyme Q10 (CoQ10)

28. Black Cohosh (Actaea racemosa)
29. Ascorbic Acid (Vitamin C)
30. Tocopherols (Vitamin E)
31. Skullcap (Scutellaria baicalensis)
32. Collagen
33. Creatine Monohydrate
34. Bee Pollen
35. Cinnamon (Cinnamomum verum)
36. Parsley (Petroselinum crispum)
37. Cranberry (Vaccinium, oxycoccus)
38. Celery (Apium graveolens)
39. Brussel Sprout (Brassica oleracea)
40. Manuka Honey
41. Carrot (Daucus carota)
42. Devil's Claw (Harpagophytum procumbens)
43. Ginger (Zingiber officinale)
44. Green Tea (Camellia sinensis)
45. MSM (Methylsulfonylmethane)
46. Pine Bark Extract (Pinus pinaster)
47. Quercetin
48. Resveratrol
49. Rosemary (Rosemarinus officinalis)
50. Rose Hip (Rosa domestica)
51. Willow Bark Extract (Salix alba)
52. Cannabadiol (CBD) CAUTION - DO NOT RECOMMEND! AT THIS TIME IT IS ILLEGAL TO RECOMMEND CBD OIL IN A VETERINARY HOSPITAL
53. There are many more, please ask if your supplement does not show up here!

# Rehabilitation Services:

**Why do we offer so many types of rehab?:** What do you do for exercise? Play a sport, run, swim, hike, lift weights, etc. Every person has different preferences and so do animals. Certain rehab techniques are better for some conditions than others, more/less invasive, passive, and active. The goal is to have a therapy technique to best fit each particular dog's preference and condition.

## Rehabilitation Exercise:

**What is it?:** We have a wide range of exercises, obstacles, and equipment to help your pet maintain and increase their balance, agility, and strength.

**Indication:** May potentially help increase balance, agility, and strength.

**Example Protocol:** One of each balance, agility, and strength exercises each for 5 min for a total of 15 min 2 days a week for 4-8 weeks.

**Rehab Tips:** Each dog has preferences just like you and I. Try to let the dog guide which exercises they like best and make a note of which they love and hate for future reference! If an exercise is not going well, switch it up. If an exercise is going well, go for double time or challenge them by mixing multiple exercises.

1. Balance Exercises:
    - Inflatable Peanut
    - Inflatable Donut
    - Inflatable Paw Pods
    - Inflatable Balance Disk
    - Rectangular Balance Board
    - Circular Balance Board
    - Orthopedic Mats

2. Agility Exercises:
    - Adjustable Cone Hurdles
    - Agility Tunnel
    - Agility Weave Poles
    - Cavaletti Platforms
    - Cavaletti Speed Bumps
    - Cavaletti Cube Field
    - Cargo Net

3. Strength Exercises:
    - Sandbag Drag System
    - Portable Weight Pods
    - Weighted Vests
    - Resistance Bungies

## Terrestrial Suspension Treadmill:

**What is it?:** We are using an extra long treadmill with suspension capabilities to help increase your pets strength to stand and walk on their own.

**Indication:** May potentially help increase strength and ability to stand and walk.

**Example Protocol:** Walk for 5 min to start out with building up to 15 min walks with less suspension needed over time.

**Rehab Tips:** Place the guide wall and set the suspension level from the start before the treadmill is turned on. If the suspension level needs to be adjusted, pause the treadmill first. Make sure the rope is tied well around the cleat! You don't want it coming loose while the treadmill is on. Pull the red emergency stop switch for emergencies!

## Ultrasound Guided PRP Therapy (Platelet Rich Plasma):

**What is it?:** We are taking some blood from your pet, taking out the red blood cells and leaving the plasma which has healing properties by injecting the plasma directly into the place in your pet that needs help using ultrasound guidance.

**Indication:** May potentially help reduce pain, inflammation, and accelerate tissue healing.

**Example Protocol:** Draw a full 10ml of blood in a 10ml blue sodium citrate tube. Spin down in the centrifuge with counterweight for 10 min at 3000 rpm. Give 1-3 injections each one month apart into the target area under ultrasound guidance.

**Rehab Tips:** MUST USE 10ML BLUE SODIUM CITRATE TUBES FOR BLOOD COLLECTION! Do not inject the red blood cell portion of the spun sample. Works well with Piezowave.

## Ultrasound Guided Regenerative Medicine Therapy (Amniotic Allograft):

**What is it?:** We are working with a company that is taking acellular allografts from the amniotic fat of other dog births without harming them or the puppies, which has healing properties by injecting the regenerative material exactly into the place in your pet that needs help using ultrasound guidance.

**Indication:** May potentially help reduce pain, inflammation, and accelerate tissue healing.

**Example Protocol:** As directed on product label. Give 1-3 injections each one month apart into the target area under ultrasound guidance.

**Rehab Tips:** This is not from aborted puppies. This has no stem cells or any cells in it. It is from amniotic fat of dogs that were born ethically. Works well with Piezowave.

## Aromatherapy:

**What is it?:** We are diffusing frankincense as a passive therapy which may help reduce anxiety, pain, inflammation.

**Indication:** May potentially help reduce anxiety, pain, inflammation, and accelerate tissue healing.

**Example Protocol:** Place 1-2 drops of frankincense oil in the diffuser per session.

**Rehab Tips:** Frankincense oil is super expensive! Do not use if the dog is in respiratory distress! Do not use if you have allergies to perfumes! DO NOT FEED OR PLACE THE FRANKINCENSE OIL ON THE DOG!

## Needleless Mesotherapy:

**What is it?:** We are using a needleless intradermal injector to propel the medication in a tiny hair thin stream into the skin.

**Indication:** May potentially help reduce pain.

**Example Protocol:** Give 0.1-1ml Lidocaine intradermal injection per site using needleless injector 2 days a week for 4 weeks.

**Rehab Tips:** Ensure the needleless injector is sterilized in between uses! Press the needleless injector perpendicular (straight up and down) on skin to form a crater for each injection. Great for use in combination with Piezowave!

## Acupressure (Tui-na):

**What is it?:** We are applying massage into specific points in order to stimulate a calming response and reduce pain, inflammation, and accelerate tissue healing.

Indication: May potentially help reduce anxiety, pain, inflammation, and accelerate tissue healing.

**Example Protocol:** 3-5min massage per site 1-2 days a week for 4-8 weeks.

**Rehab Tips:** See acupuncture for points!

Tui-na Techniques:

1. Circular rubbing skin (Mo fa)
2. Pushing skin (Tui fa)
3. Gentle pinching skin (Nie fa)
4. Pulling skin up (Na fa)
5. Patting skin (Pai-fa)
6. Shaking legs (Dou-fa)

## Needleless Aquapuncture:

**What is it?:** We are applying vitamin B complex into specific points in order to stimulate a calming response and reduce pain, inflammation, and accelerate tissue healing.

**Indication:** May potentially help reduce anxiety, pain, inflammation, and accelerate tissue healing.

**Example Protocol:** Give 0.1-1ml Vitamin B complex intradermal injection using needleless injector at each desired acupuncture point 1 day every 2-3 months.

**Rehab Tips:** See acupuncture for points!

## Sonopuncture:

**What is it?:** We are applying focused sound waves into specific points in order to stimulate a calming response and reduce pain, inflammation, and accelerate tissue healing.

**Indication:** May potentially help reduce anxiety, pain, inflammation, and accelerate tissue healing.

**Example Protocol:** Place the stem of the sonopuncture fork/bowl touching the acupuncture point desired and hold for 15-45 seconds per point 1-2 days a week for 4-8 weeks.

**Rehab Tips:** See acupuncture for points! USE BLUE ULTRASOUND GEL ON TIP OF APPLICATOR! To activate the sonopuncture fork hit the round weighted portion of the fork gently against your wrist without clanging together to activate the sound wave production. To activate the sonopuncture bowl gently tap the bowl rim with the felt mallet. This must be repeatedly done every 45 seconds to have sufficient sound wave production. DO NOT USE IN FRACTURES!

Sonopuncture Fork Frequencies:

1. 700g Zen Bowl: strongest sound waves, penetrates about 12cm
2. 32hz (longest): stronger sound waves, penetrates about 8cm
3. 64hz (middle length): middle strength sound waves, penetrates about 6.5cm
4. 128hz (shortest): weaker sound waves, penetrates about 5cm

## Acu-Laser:

**What is it?:** We are applying a focused laser into specific points in order to stimulate a calming response and reduce pain, inflammation, and accelerate tissue healing.

**Indication:** May potentially help reduce anxiety, pain, inflammation, and accelerate tissue healing.

**Example Protocol:** The laser has all protocols downloaded on it! 1-2 days a week for 4-8 weeks.

**Rehab Tips:** See acupuncture for points! REPLACE LASER TIP WITH THE SMALLEST HEAD! Please replace it back to the globe applicator when finished.

## Wheelchair Sizing & Trial:

**What is it?:** We are fitting a wheelchair with dogs that have severe muscle wasting, muscle weakness (paresis), or muscle paralysis who are not able to stand up or walk again. Not all dogs and owners are a good fit for wheelchairs.

**Indication:** May potentially help dogs with severe muscle wasting, muscle weakness (paresis), or muscle paralysis.

**Example Protocol:** measurements here

**Rehab Tips:** The wheelchair is more work for the owner than the animal. A lot of times the wheelchairs are given up on because of this. The wheelchair is really the last resort for dogs that cannot use their back legs well enough to get up or walk.

## Hard/Soft Leg Brace Sizing & Trial:

**What is it?:** We are fitting a hard/soft leg brace with dogs that have joint instability who have difficulty to stand up or walk. Not all dogs and owners are a good fit for hard/soft leg braces.

**Indication:** May potentially help dogs with joint instability.

**Example Protocol:** See aocpet.com for hard brace and agonusa.com for soft brace instructions.

**Rehab Tips:** The hard/soft leg brace is more work for the owner than the animal. A lot of times the soft leg braces are given up on because of this. The hard/soft leg brace is an extra measure for dogs in between therapy appointments.

## Orthopedic Acupuncture:

**What is it?:** We are applying tiny, hair thin needles into specific points in order to stimulate a calming response and reduce pain, inflammation, and accelerate tissue healing.

**Indication:** May potentially help reduce anxiety, pain, inflammation, and accelerate tissue healing.

**Example Protocol:** Once all acupuncture needles are placed leave for 10-15 min 1-2 days a week for 4-8 weeks.

**Rehab Tips:** Always start with GV20 to help calm them down. To be safe only use 0.5 inch DBC acupuncture needles with neon orange handles so you don't lose them in the dog fur. Keep a needle count to not miss any and put the used needles in the sharps. Don't reuse needles. CAUTION - the dog may shake and launch needles at you. Cover your eyes! Do not replace needles if they fall out more than halfway through.

Common Orthopedic Acupuncture Points:

i. Neck Pain: Er-jian, GV 14
ii. Back Pain: BL 20, BL 21
iii. Shoulder Pain: LI 15, TH14, SI 10, SI 9
iv. Scapular Pain: SI 11, SI 12, SI 14
v. Elbow Pain: LI 11, LU 5, LI 4, TH 10, TH 5, GV 14
vi. Carpal Pain: TH 4, LI 5, TH 5
vii. Lumbar Pain: BL 23, BL 24, BL 25, BL 26, BL 27, BL 40, GB 30, GB 29, GB 39, GB 34
viii. Hip Pain: GB 30, GB 29, GB 39, GB 34, BL 53, BL 54, Bai-hui, GV 4
ix. Knee Pain: ST 35, GB 34, ST 34, SP 9, ST 36, BL 60, BL 62, KID 6, LI 8
x. Tarsal Pain: BL 62, KI 6, ST 41, BL 60, KI 3, GB 40
xi. General Pain: SI 3, GB 34, LI 11, LI 4, LIV 3, BL 17, TH 5, GB 30, GB 39, BL 40, SP 10, BL 60, KI 3, LI 4, LIV 3, KID 3, GB 60
xii. Arthritis & Osteoarthritis: BL 23, BL 11, SI 9, BL 54, BL 40, LI 4, KID 3
xiii. Weakness: LI 10, BL 23, KID 1, ST 36
xiv. Dying Animal: GV 26, KID 1, TH 5, PC 6
xv. Calming: GV 20, GV 21, An-shen

## Heat Therapy (Thermotherapy):

**What is it?:** We are applying heat to a chronic injury in order to promote tissue healing and reduce chronic pain.

**Indication:** May potentially help treat chronic stage injuries by increasing inflammation (beyond 48 hours post injury/surgery), reduce pain, and promote tissue healing.

**Example Protocol:** 15-20 min application 1-2 days a week at 104F-113F (burns and damage will occur at 122-125F) for 4-8 weeks.

**Rehab Tips:** Heat therapy is great immediately after exercise! Place distilled water in the steamer under where the towels sit. Use hand towels or hot rocks in the steamer set for 10-15 min. Tongs can be used to pick them up if needed. If they are too hot for you, they are too hot for the animal. Never attach or leave the hot rock or towel on the animal unattended. Do not allow tissue temperature to exceed 113F. Never apply heat therapy to a fresh wound or surgical site that is less than 48 hours old. Heat works opposite to cold (obviously) and increases inflammation which can help promote tissue healing. DO NOT USE HEATING PADS!

## Cold Therapy (Cryotherapy):

**What is it?:** We are applying heat to a chronic injury in order to reduce acute inflammation and pain.

**Indication:** May potentially help reduce acute stage inflammation (within 48 hours post injury/surgery) and pain.

**Example Protocol:** 15-20 min application 2 times a day at 3-32F (skin should be 50-59F) for 2 days.

**Rehab Tips:** Cold therapy is great immediately after exercise! Use one cold rock or massage instrument from the fridge at a time. switch the one you are using with a freshly cold one every 5 min. Replace them in the fridge when you are done. Never attach or leave the cold rock or towel on the animal unattended. DO NOT USE ICE! Cold works opposite to heat (obviously) and decreases inflammation which can impede tissue healing.

## Thermal Contrast Therapy (Heat + Cold Therapy):

**What is it?:** We are applying heat + cold therapy to a subacute injury in order to begin to promote tissue healing and reduce residual subacute pain and inflammation.

**Indication:** May potentially help reduce subacute inflammation (beyond 48 hours post injury/surgery but within 6 weeks post injury/surgery), pain, and accelerate tissue healing

**Example Protocol:** Start with applying 104-113F heat therapy for 4 min then 50-59F cold therapy to the same region for 1 min for a total of 15-20 min (3-4 cycles) 1-2 days a week for 4 weeks.

**Rehab Tips:** Thermal contrast therapy can be good in transitioning from cold therapy to heat therapy in the subacute phase of the injury after 48 hours but within 6 weeks. Keep a timer to know when to switch. It sounds tedious, but trust me, stick to the times!

## Therapeutic Ultrasound:

**What is it?:** We are applying heat using ultrasonic sound waves into the tissue to a chronic injury in order to promote tissue healing and reduce chronic pain.

**Indication:** May potentially help chronic inflammation, pain, and accelerate tissue healing.

**Example Protocol:** Effective tissue heating 1MHz at 1.5W/cm2 continuous for 5-10min 1-2 days a week for 4-8 weeks.

**Rehab Tips:** USE BLUE ULTRASONIC GEL! This ultrasound unit does not take images! Compared to a normal diagnostic imaging ultrasound the therapeutic ultrasound uses extra low frequency ultrasonic waves which heat the tissue that it passes into. To check if the therapeutic ultrasound is working, use it on an empty cup of water to see if ripples form.

Therapeutic Ultrasound Frequency:

1. 1MHz for deeper injury 2-5cm depth
2. 3.3MHz for superficial injury 0.8-1.6cm depth

## E-Stim (Electrical Stimulation):

**What is it?:** We are stimulating the muscles using a gentle electrical impulse causing them to contract to strengthen them in a safe and effective way.

**Indication:** May potentially help reduce pain and increase muscle strength.

**Example Protocol:** 15-20min 1-2 days a week for 4-8 weeks

**Rehab Tips:** Use electrode gel pads on thin hair dog.

## Class IV Laser:

**What is it?:** We are reducing pain and inflammation while accelerating healing with the infrared laser without the use of any drugs.

**Indication:** May potentially help reduce pain, inflammation, infection, and accelerate tissue healing.

**Example Protocols:** The laser has all protocols downloaded on it! 1-2 days a week for 4-8 weeks.

**Rehab Tips:** WEAR PROTECTIVE GLASSES! DO NOT SHINE IN ANIMAL EYES! The difference between cold laser (class 3) and class IV laser (class 4) is that our class 4 laser is 50 times more powerful. Class 4 laser treatments take only a couple minutes while treating a deeper larger area while class 3 you have to hold in a single spot for way longer. DO NOT LASER A TUMOR!

## Piezowave (ESWT):

**What is it?:** We are reducing chronic pain while promoting healing of chronic injuries especially of the tendons, ligaments, and bones using the Piezowave without the use of any drugs.

**Indication:** May potentially help reduce chronic joint pain and promote bone, tendon, ligament, and tissue healing.

**Example Protocol:** 200 shocks per site 1 day a week for 4 weeks (800 shocks per session)

**Rehab Tips:** USE BLUE ULTRASOUND GEL WHEN USING! The clicking is the shock coming out of the tip of the applicator. The different silicone heads are used to determine the depth of the shock (larger cone head = shallow shock, smaller shallower head = deeper shock). Our Piezowave can be set at a much lower setting than other units which doesn't require sedation or anesthesia. Please call this Piezowave Therapy instead of shock wave therapy. This is called shock wave therapy, however that sounds painful and scary. If the animal is uncomfortable, turn the intensity down until they tolerate the therapy. DO NOT USE ON A TUMOR OR INFECTED SITE.

## Magnawave (PEMF):

**What is it?:** We are reducing pain and inflammation while promoting healing using the Magnawave's magnetic field generation without the use of any drugs.

**Indication:** May potentially help reduce pain, inflammation, and accelerates tissue healing

**Example Protocol:** 10-20 min application per site 1-2 days a week for 4-8 weeks

**Rehab Tips:** Muscle twitching is normal with each pulse. Don't put the paddle on your phone, credit card, or another electronic device since it creates a magnetic field from the paddle.

## Blue Laser Dermatologic Therapy:

**What is it?:** We are using blue light to help with dermatologic disease.

**Indication:** May potentially help reduce inflammation, cancer proliferation, atopic dermatitis, pruritus, antibiotic resistant skin infections, wound treatment, vitiligo, psoriasis, eczema, and surgical site infection.

**Example Protocol:** Blue light for up to 27 seconds per site.

**Rehab Tips:** YOU AND THE ANIMAL MUST WEAR PROTECTIVE GLASSES!

## UV Excimer Dermatologic Therapy:

**What is it?:** We are using UV light to help with dermatologic disease.

**Indication:** May potentially help reduce inflammation, atopic dermatitis, pruritus, antibiotic resistant skin infections, wound treatment, vitiligo, psoriasis, eczema, and surgical site infection.

**Example Protocol:** UV light for up to 5 seconds per site.

**Rehab Tips:** YOU AND THE ANIMAL MUST WEAR PROTECTIVE GLASSES! CAN CAUSE CANCER!

## Cupping Therapy:

**What is it?:** We are placing cups on the dog which suck the skin into it to increase local blood and lymphatic circulation, as well as reduce pain.

**Indication:** May potentially help reduce pain, inflammation, and accelerate tissue healing.

**Example Protocol:** Cup left on the skin no longer than 3-5 min per site 1-2 days a week for 4-8 weeks

**Rehab Tips:** Cupping is slightly uncomfortable and hair can interfere with the seal being formed. You should see the skin visibly be sucked into the cup. Bruising can occur and is a normal side effect.

## Microneedle Dermatologic Therapy:

**What is it?:** We are using tiny needles to induce hair growth, healing cascade, and release of growth factors within the skin.

**Indication:** May potentially help reduce inflammation, photodamage, alopecia, dyschromia, acne, and scars.

**Example Protocol:** 0.5 mm microneedling of the skin one time.

**Rehab Tips:** Make sure to use sterile needle attachment! Can cause a small amount of bleeding.

## Instrument Assisted Massage:

**What is it?:** We are massaging the muscles to help increase blood flow to an area which can help accelerate healing and reduce pain.

**Indication:** May potentially help reduce pain and accelerate tissue healing.

**Example Protocol:** 3-5 min massage per site 1-2 days a week for 4-8 weeks

**Rehab Tips:** For the ball and pin technique, start with broad tools first (ball) to increase local circulation, followed by focused tools (pin) for muscle knots or pressure points. Pressure points can be detected as an area of tightness in the muscle tissue and mild uncomfortable feeling/reaction from the animal.

Massage Tool Surface Types:

1. Hands: most gentle
2. Gua Sha (Stainless Steel): pressure points and broad areas
3. Ball: broad areas
4. Pin: pressure points
5. Percussion Massager: broadest areas, dogs that tolerate it
6. Hot/Cold Rocks: see heat therapy and cold therapy!

Massage Tool Material Types:

1. Copper
2. Aragonite (brown and tan)
3. Angelite (light blue)
4. Hematite (charcoal grey)
5. Pyrite (dark gold)

6. Dragon's Blood (dark red and green)
7. Rose Quartz (light pink)
8. Selenite (white)

## Ultrasound Guided Joint Injection:

**What is it?:** We are using an ultrasound to inject medication that will help the joint exactly into the place in your pet that needs help.

**Indication:** May potentially help reduce pain, inflammation, and accelerate tissue healing.

**Example Protocol:** See each individual drug protocol!

**Rehab Tips:** Ultrasound and thermal imaging can be used to help guide the injections to the correct spot. Not all joint injections go into the joint itself! Eventually, all our injections will be needleless.

Injectable Drugs/Products:

1. Adequan
2. Hytryl
3. PRP
4. CanisCell AniMatrix D
5. Pentosan Polysulfate

## Rehab Media Capture (3D Printing, Trolley Cam, Drone, Rehab Computer):

**What is it?:** We try to capture great "before and after" images, 3D models and videos for owners, social media, and rehab program promotion.

**Rehab Tips:** Ask for help if you need it! Never let media capture reduce the quality of care provided. It is an important aspect of the rehab program to convince new technicians, owners, and veterinarians that we can make a huge difference for animals. CAUTION 3D PRINTING RESIN IS TOXIC WHEN IN LIQUID FORM!

# Products, Medications, & Supplements:

**Why isn't Carprofen and laser good enough?:** Never say good enough! I will never accept "it's just a dog" as an excuse to simplify veterinary medicine. We must be persistent in our quest to not only practice medicine, but constantly improve upon it for the future.

## Purina Pro Plan Overweight Management Food (cat/dog, wet/dry):

**What is it?:** Veterinarian formulated and nutritionally balanced daily dog food, cat food, wet food, or dry food combination. Plant-based and optimized for making the pet feel full while keeping the overall calorie count low and protein high to encourage weight loss.

**Indication:** May potentially help dogs and cats reduce overall body weight and ease pain and pressure of the joints.

**Example Protocol:** Twice daily meal as directed on label or calculated by daily resting energy requirement (RER).

**Rehab Tips:** It is always best to calculate resting daily energy requirement (RER) to calculate exactly how many grams of food per day the animal needs to maintain or reach a desired body weight. The RER calculation does not include treats or table scraps which should be minimized and should not exceed 10% of their total RER calories per day. Don't forget to divide by 2 if the total daily calories are being fed at 2 meals per day! Free feeding (leaving the food bowl full all day instead of meals) promotes obesity.

## Myos Muscle Formula Powder (Primary Daily Muscle Supplement):

**What is it?:** Safe egg-based protein supplement for dogs and cats.

**Indication:** May potentially help dogs and cats with muscle wasting, muscle degeneration, or muscle weakness.

**Example Protocol:** Once daily muscle supplement powder as directed on product label.

**Rehab Tips:** This can be used for dogs and cats! Just make sure the cat amount is correct as seen on the product website! Make sure there is no kidney disease present since protein puts some stress on the kidneys.

## BullyMax Training Muscle Chews (Secondary Daily Muscle Supplement):

**What is it?:** Protein rich chew which can be useful in daily training and encouragement.

**Indication:** May potentially help muscle wasting, muscle weakness, and muscle degeneration.

**Example Protocol:** Not greater than 10% of daily total calorie intake.

**Rehab Tips:** Do not use these as free clinic treats, sell the owner a bag and use theirs during therapy.

## Dasuquin MSM Joint Chews (Primary Daily Joint Supplement):

**What is it?:** Once daily joint supplement chew with mostly glucosamine and chondroitin. The Go-To joint supplement really.

**Indication:** May potentially help all dogs, but especially medium-large breeds with joint pain, mobility problems, or are over the age of 6 should be on daily joint supplements.

**Example Protocol:** Once daily joint supplement chew as directed on product label.

**Rehab Tips:** Dogs do not need to have surgery or a joint problem to be on a joint supplement. Supplements work best when used for long periods of time before they are needed in order for them to have a chance to prevent injury in the first place.

## Nordic Naturals Pet 16oz Fish Oil (Primary Daily Joint Supplement):

**What is it?:** Once daily joint supplement fish oil.

**Indication:** May potentially help all dogs, but especially medium-large breeds with joint pain, mobility problems, or are over the age of 6 should be on daily joint supplements.

**Example Protocol:** Once daily joint supplement fish oil as directed on product label.

**Rehab Tips:** REFRIGERATE! Expires in 3 months after opening! Gel capsules are more expensive, not enough fish oil, plus hard to swallow.

## Myos Collagen Joint Chews (Secondary Daily Joint Supplement):

**What is it?:** Collagen, blueberry, and turmeric joint supplement daily chew. Generally, this is a secondary chew to be used with Dasuquin MSM. This can also be a cheaper alternative than Dasuquin MSM if needed.

**Indication:** May potentially help all dogs, but especially medium-large breeds with joint pain, mobility problems, or are over the age of 6 should be on daily joint supplements.

**Example Protocol:** Once daily joint supplement chew as directed on product label.

**Rehab Tips:** Dogs do not need to have surgery or a joint problem to be on a joint supplement. Supplements work best when used for long periods of time before they are needed in order for them to have a chance to prevent injury in the first place.

## Vetriscience Amilextin Joint Chews (Tertiary Daily Joint Supplement):

**What is it?:** Herbal based joint supplement daily chew. Generally, this is a tertiary chew to be used with Dasuquin MSM and Myos collagen chews.

**Indication:** May potentially help all dogs, but especially medium-large breeds with joint pain, mobility problems, or are over the age of 6 should be on daily joint supplements.

**Example Protocol:** Once daily joint supplement chew as directed on product label.

**Rehab Tips:** Dogs do not need to have surgery or a joint problem to be on a joint supplement. Supplements work best when used for long periods of time before they are needed in order for them to have a chance to prevent injury in the first place.

## Adequan (Primary Joint Injection):

**What is it?:** Polysulfated Glycosaminoglycan (PSGAG) is a joint injection.

**Indication:** May potentially help reduce pain, inflammation, and accelerate tissue healing.

**Example Protocol:** 2-5 mg/kg SC 2 days a week for 4 weeks every 6 months as directed on product label.

**Rehab Tips:** Can give to dogs and cats.

## Hytryl (Secondary Joint Injection):

**What is it?:** Hyaluronic acid, hyaluronan, hyaluronate, or anionic non-sulfated glycosaminoglycan is naturally present in the body.

**Indication:** May potentially help reduce pain, inflammation, and accelerate tissue healing.

**Example Protocol:** Loading dose of 1 day per week for 3 weeks then 1 day per month as needed.

**Rehab Tips:** Works well with adequan. Can give to dogs and cats.

## Pentosan Polysulfate (Tertiary Joint Injection):

**What is it?:** Pentosan Polysulfate Sodium (PPS) is a joint injection.

**Indication:** May potentially help reduce pain, inflammation, and accelerate tissue healing.

**Example Protocol:** 3 mg/kg SC 1 day a week for 4 weeks as directed on product label.

**Rehab Tips:** Can give to dogs and cats.

## CanisCell AniMatrix D (Quaternary Joint Injection):

**What is it?:** We are working with a company that is taking acellular allografts from the amniotic fat of other dog births without harming them or the puppies, which has healing properties by injecting the regenerative material exactly into the place in your pet that needs help using ultrasound guidance.

**Indication:** May potentially help reduce pain, inflammation, and accelerate tissue healing.

**Example Protocol:** As directed on product label.

**Rehab Tips:** This is not from aborted puppies. This has no stem cells or any cells in it. It is from amniotic fat of dogs that were born ethically. Works well with Piezowave.

## Agon Forelimb/Hindlimb Soft Leg Brace (Primary Joint Stabilization):

**What is it?:** Adjustable velcro strap soft brace. Very inexpensive.

**Indication:** May potentially help animals with difficulty standing up or walking with front or rear leg pain, inflammation, muscle weakness, or instability.

**Example Protocol:** See brace fitting for measurements!

**Rehab Tips:** The hard/soft leg brace is more work for the owner than the animal. A lot of times the soft leg braces are given up on because of this. The hard/soft leg brace is an extra measure for dogs in between therapy appointments.

## Animal Ortho Care Custom Hard Leg Brace (Secondary Joint Stabilization):

**What is it?:** Custom made hard brace for each animal. Very expensive.

**Indication:** May potentially help animals with difficulty standing up or walking with front or rear leg pain, inflammation, muscle weakness, or instability.

**Example Protocol:** See brace fitting for measurements!

**Rehab Tips:** The hard/soft leg brace is more work for the owner than the animal. A lot of times the soft leg braces are given up on because of this. The hard/soft leg brace is an extra measure for dogs in between therapy appointments.

## Walkin' Wheels Adjustable Dog Wheelchair (Tertiary Joint Stabilization):

**What is it?:** Customizable wheelchair with multiple adjustable lengths. Fairly expensive.

**Indication:** May potentially help animals with difficulty standing up or walking with front or rear leg pain, inflammation, muscle weakness, or instability.

**Example Protocol:** See wheelchair fitting for measurements!

**Rehab Tips:** The wheelchair is more work for the owner than the animal. A lot of times the wheelchairs are given up on because of this. The wheelchair is really the last resort for dogs that cannot use their back legs well enough to get up or walk.

## Loobani Portable Dog Sling:

**What is it?:** Portable sling for dogs with weak rear legs for the owner to help lift them from the abdomen while walking or standing up. Very inexpensive.

**Indication:** May potentially help animals with difficulty standing up or walking with rear leg pain, inflammation, muscle weakness, or instability.

**Example Protocol:** Use as needed anywhere.

**Rehab Tips:** Make sure to wash regularly!

## Paw Print Oxygen:

**What is it?:** Portable canned oxygen to go home just in case.

**Indication:** May potentially help reduce respiratory distress and increase athletic performance.

**Example Protocol:** As needed, as directed on product label.

**Rehab Tips:** Do not store in a hot place or direct sunlight!

## Four Leaf Rover Turkey Tail Powder (Primary Daily Cancer Supplement):

**What is it?:** Turkey tail is a natural non-toxic mushroom powder supplement.

**Indication:** May potentially help cancer patients.

**Example Protocol:** Once daily cancer supplement powder as directed on product label.

**Rehab Tips:** Great for cancer patients!

## FitBark 2 + Free Phone App:

**What is it?:** Collar attachable daily fitness monitor for your dog with 6 month battery life, free phone app, and no subscription charge.

**Indication:** May potentially help reduce obesity, muscle wasting, muscle weakness, post-op surgery recovery, and arthritis.

**Example Protocol:** Wear for life. Add fitness information to the medical record.

**Rehab Tips:** Waterproof! Should recommend to pretty much every dog who needs rehabilitation to track exercise.

## PetLibro Granary Auto-Pet Feeder:

**What is it?:** Dog/Cat automatic food bowl with consistent portion dispensing control and dispensing time setting.

**Indication:** May potentially help reduce obesity, muscle wasting, post-op surgery recovery, and help manage diabetes.

**Example Protocol:** Replace feeding bowl at home.

**Rehab Tips:** Allows the ability to easily control the exact amount of food and time of the meals at home. Exact meal settings can be added to the medical record.

## Injectable Vitamin B Complex:

**What is it?:** Cheap vitamin supplement used for synthesizing new cells.

**Indication:** May potentially be used in needleless intradermal aquapuncture to reduce pain and inflammation.

**Example Protocol:** See needleless aquapuncture!

**Rehab Tips:** Can be light pink, DO NOT MISTAKE THIS FOR EUTHANASIA SOLUTION!

## Injectable Lidocaine:

**What is it?:** Short acting pain medication.

**Indication:** May potentially be used in needleless intradermal mesotherapy to reduce pain.

**Example Protocol:** See needleless mesotherapy!

**Rehab Tips:** DO NOT INJECT IN BLOOD VESSEL! This is clear, DO NOT MISTAKE IT FOR SALINE! DO NOT ALLOW THE DOG TO LICK THIS!

## 3D Printed Products:

**What is it?:** We use resin 3D printing to print prosthetics, leg braces, and so much more.

**Indication:** Literally everything

**Example Protocol:** Anything we can imagine we can print.

**Rehab Tips:** CAUTION 3D PRINTING RESIN IS TOXIC WHEN IN LIQUID FORM!

# COMING SOON:

**What more could we possibly need?** Absolutely everything necessary. I will never stop searching for problems and solutions, and even potentially better solutions. Rehabilitation is a core part of veterinary medicine and human medicine for that matter.

## Underwater Treadmill (Hydrotherapy):

**What is it?:** We are using an extra large water treadmill to help your pet get stronger and live longer.

## Cryogenic Gas Therapy:

**What is it?:** We are using the exact same treatment methods that professional human athletes use to prevent and treat injury.

## Laser Vein Guidance:

**What is it?:** Line up! Everyone gets 3 sticks until the catheter is placed. What happens when every leg is blown? Try a little higher!

## Laser Guided Needleless IM & SC Injections:

**What is it?:** The needle and syringe is nearly 200 years old. It is time we innovated with laser precision.

## Tekscan Gait Analysis:

**What is it?:** Lameness is no longer a guess.

## TECAR Radiofrequency Therapy:

**What is it?:** A new form of thermotherapy.

## IRAP Therapy (Interleukin-1 Receptor Antagonist Protein):

**What is it?:** I do not rap. This is not that kind of rap.

## Quadruped Cybernetic Tutorialization:

**What is it?:** We shall go where no veterinarian has gone before.

## Mobile Computerized Tomography (CT):

**What is it?:** Disease cannot hide from us.

## Proton Beam Radiation Therapy:

**What is it?:** Cancer and arthritis may have a cure.

# Therapies Considered Potentially Too Dangerous and/or Not Helpful:

**Where do we stop?:** One of the Hippocratic oaths of veterinary medicine is “primum non nocere” or “first, do no harm”. There is a fine line between palliative care (end of life care at the expense of overall health) and doing no harm. However, there are some therapies even I believe may be too dangerous and/or not helpful.

## Hyperbaric Oxygen Therapy:

**What is it?:** Placing an animal in a pressurized chamber with only pure oxygen for claimed healing properties.

**Why is this Dangerous?:** Limiting the use of unnecessary extreme fire and explosion risk for animals and to nearby staff, other animals, owners, and children.

## Incense Burning & Moxibustion:

**What is it?:** Burning of incense and other herbs for claimed healing properties.

**Why is this Dangerous?:** Limiting the use of unnecessary carcinogenic smoke inhalation risk for animals and to nearby staff, other animals, owners, and children.

## Hemopuncture (Bloodletting):

**What is it?:** Intentionally piercing a vein to allow blood to drain from the body for claimed healing properties.

**Why is this Dangerous?:** Intentional blood loss can predispose to disease and weaken the animal.

## Radioactive Isotope Joint Injections:

**What is it?:** Using radioactive substance injection for claimed healing properties.

**Why is this Dangerous?:** Limiting the use of unnecessary radioactive substance injection risk for animals and to nearby staff, other animals, owners, and children.

## Gold Bead Implantation (GBI):

**What is it?:** Placing gold foreign bodies in multiple places of the animal with little to no basis in western medicine and western science.

**Why is this Dangerous?:** Intentionally introducing foreign material into the animal and potentially making the animal more susceptible to disease.

## Stem Cell Therapy:

**What is it?:** Drilling a hole in a normal bone in a lame animal to disrupt the bone marrow and place it into a different area of the body where stem cells are not normally found.

**Why is this Dangerous?:** Too invasive, excessive destruction of local bone and underlying bone marrow potentially making animals more susceptible to disease.

## Bone Marrow Aspirate Concentrate Therapy (BMAC):

**What is it?:** Drilling a hole in a normal bone in a lame animal to disrupt the bone marrow and place it into a different area of the body where bone marrow is not normally found.

**Why is this Dangerous?:** Too invasive, excessive destruction of local bone and underlying bone marrow potentially making animals more susceptible to disease.

## SOME Chinese Herbal Medicine:

**What is it?:** Concoctions of potentially dangerous and toxic herbs.

**Why is this Dangerous?:** Toxicity and organ damage risk with little to no basis in western medicine and western science.

## SOME Chinese Acupuncture:

**What is it?:** Increased needle insertion depths greater than 0.5 in, as well as piercing the thoracic or abdominal cavity.

**Why is this Dangerous?:** Limiting the use of unnecessary pneumothorax risk for animals.

## SOME Chiropractic Techniques:

**What is it?:** Popping of the joints, neck, and back.

**Why is this Dangerous?:** There is evidence to suggest popping joints is harmful to health in western medicine and western science.

## Electro-Acupuncture:

**What is it?:** Running electric currents through acupuncture needles embedded in the skin and muscle.

**Why is this Dangerous?:** E-stim and Piezowave seem to be more efficacious and evidence based in western medicine and western science.

## Metal & Crystal Healing Therapy:

**What is it?:** Metals and crystals with claimed healing properties used in massage, implantation, ingestion, and ritual.

**Why is this Dangerous?:** Little to no basis in western medicine and western science.

## Magick, Chi, Chakras, Reiki, Divination, Prayer, Pagan, Satanic Healing Rituals:

**What is it?:** Words, symbols, and chants with claimed healing properties used in massage, implantation, ingestion, and ritual.

**Why is this Dangerous?:** Little to no basis in western medicine and western science.

## SOME Essential Oil Therapy:

**What is it?:** Diffusing of, topical use of, and ingestion of highly concentrated oils for claimed healing purposes.

**Why is this Dangerous?:** Toxicity and organ damage risk to the animal as well as little to no basis in western medicine and western science.

## Corticosteroid Joint Injections:

**What is it?:** Placing corticosteroids in the joint for claimed healing properties.

**Why is this Dangerous?:** Limiting unnecessary use of corticosteroids in western medicine.

## Music & External Sound Healing:

**What is it?:** Music and external sound with claimed healing properties.

**Why is this Dangerous?:** Little to no basis in western medicine and western science.

## Poison & Venom Therapy:

**What is it?:** Using toxic substances in the blood, tissue, and ingestion for claimed healing purposes.

**Why is this Dangerous?:** Limiting the use of unnecessary toxic substance exposure risk for animals and to nearby staff, other animals, owners, and children.

## Ozone Therapy:

**What is it?:** Using carcinogenic ozone in the blood, tissue, and rectum for claimed healing purposes.

**Why is this Dangerous?:** Limiting the use of unnecessary carcinogen gas exposure risk for animals and to nearby staff, other animals, owners, and children.

## Regional Limb Perfusion:

**What is it?:** Sectioning off a leg and allowing for drugs to circulate in the leg with restricted blood supply as an attempt to enhance drug effect.

**Why is this Dangerous?:** Limiting unnecessary risk of restricting blood supply with potential for cell and tissue damage for the animal.

## Blood Flow Constriction Therapy:

**What is it?:** Using tight bands on the legs to restrict blood flow during exercise.

**Why is this Dangerous?:** Limiting unnecessary risk of restricting blood supply with potential for cell and tissue damage for the animal.

## Nuclear Scintigraphy:

**What is it?:** Using radioactive substance injection to generally find which area of the bone structure is associated with lameness.

**Why is this Dangerous?:** Limiting the use of unnecessary radioactive substance injection risk for animals and to nearby staff, other animals, owners, and children.

## Cryolipolysis Therapy:

**What is it?** Using targeted frostbite to kill fat cells in the animal claimed to treat obesity.

**Why is this Dangerous?:** Limiting unnecessary risk of frostbite and tissue damage for the animal.

## Kinesiology Taping:

**What is it?** Applying tape to the skin in order to create or reduce tension claimed to reduce pain and inflammation.

**Why is this Dangerous?:** Largely ineffective due to fur and potential choking and foreign body hazard for the animal.

## Toenail Grips & Shoes:

**What is it?** Small rubber bands/rings/caps are placed on all toenails and may be glued for claimed benefits of providing stabilization when walking or standing up.

**Why is this Dangerous?:** Largely ineffective, also promotes the use of superglue directly onto animals. Shoes typically are gait altering and could lead to more strain on the joints due to abnormal movements and stress on the animal.

## Pool Therapy:

**What is it?** Swimming in a shallow or deep pool for claimed exercise benefits.

**Why is this Dangerous?:** Limiting unnecessary risk of aspiration pneumonia from water inhalation during difficulty swimming for the animal. There is also a risk of drowning.

## Blood Irradiation (using UV or Ozone):

**What is it?** Removing blood and infusing it with ozone or irradiating it with UV light then reinfecting it.

**Why is this Dangerous?:** Limiting the use of unnecessary carcinogenic and toxic substance risk for animals and to nearby staff, other animals, owners, and children.

## Leg Hobbles:

**What is it?** Using tape, rope, or a belt/strap to tie the back legs together at the level of the knee or ankle for claimed reduction of use benefits.

**Why is this Dangerous?:** Forceful restriction of movement can lead to panicked, exaggerated movements and increase the likelihood of injury and leg use. Pressure sores, tripping, falling over, stress, and abnormal joint movements are all additional risks.

## Carprofen for Life (Especially without monitoring):

**What is it?** Prescribing Carprofen for indefinite periods of time greater than 3-6 months.

**Why is this Dangerous?:** Limiting the unnecessary risk of long term Carprofen. Carprofen damages the kidneys and liver over extreme long term use.